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Welcome to new knowledge

6th Symposium

of the Scandinavian Japan Radiological Society

9th Nordic Japan PACS Symposium

September 7 - 9, 2006

Stockholm, Sweden

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THURSDAY, September 7, 2006

08:15-09:00	Registration	
09:00-	Welcome	Peter Aspelin
09:05-09:15	Introductory lectures: - Foundation of Scandinavian Japanese Society of Radiology	Professor Emeritus Takahiro Kozuka
09:15-09:30	- CAD in Japan	Professor Hiroshi Fujita
09:30-09:45	- How can today's research influence healthcare in the future?	Professor Peter Aspelin
ABDOMINAL IMAGING		
Moderators: Chikazumi Kuroda and Lennart Blomqvist		
09:45-10:10	State-of-the-art in pancreatic imaging	Nils Albiin
10:10-10:20	Can adequate distension of the small bowel be achieved when performing magnetic resonance imaging without use of the Sellink method?	Michael R. Torkzad
10:20-10:35	Common bile duct stone and evidence based analysis - Image strategy in diagnosing common bile duct stone	Bo Lindberg
10:35-10:45	PolyCystic Ovary Syndrome and the Metabolic Syndrome	Henrik Leonhardt
10:45-11:10	Coffee break	
PACS		
Moderators: Kiyonari Inamura and Silas Olsson		
11:10-11:25	Development of mobile EMR system with PACS on the fused infrastructure with internet and satellite communication	Hiroshi Kondoh
11:25-11:40	Potential usefulness of an automated patient recognition method of chest radiographs for preventing filing errors in PACS environment	Junji Morishita
11:40-11:50	The Function and Effect in a Paper-less, Film-less, Totally Digitalized Hospital	Yasutomi Kinoshita
11:50-12:00	Legal issues when implementing a teleradiology solution based on the IHE-XDS-I profile	Aslak Aslaksen
12:00-13:00	Lunch	
VASCULAR / INTERVENTIONAL IMAGING		
Moderators: Junro Hosaka and Per Kristian Hol		
13:00-13:25	State-of-the-art, Evolution of MR angiography	Håkan Ahlström
13:25-13:35	Hybrid interventional treatment of severe deep venous thrombosis	Hiroyuki Tajima
13:35-13:45	Ultrasound-guided sclero-therapy to occlude insufficient perforating vein	Junro Hosaka
13:45-13:55	Initial Experience with PTA Using a New Curved Balloon Catheter for Native Arteriovenous Hemodialysis Shunt Failure	Kazunori Kuroki
13:55-14:05	Transradial Uterine arterial embolization for uterine fibroids	Tomoyasu Sato
14:05-14:15	Closed renal circuit for ethanol embolization - Preliminary experiment and Clinical investigation of renal cell carcinoma	Shiro Onozawa
14:15-14:25	Overview of the Sinking Skin Flap Syndrome	Hirohiko Ito
14:25-14:35	In vitro Assessment of Glycerophosphorylcholine in Normal Pig Liver after Transcatheter Arterial Embolization by High Field Proton Magnetic Resonance Spectroscopy	Yumiko Tsukiyama
14:35-14:50	Intraoperative MRI improves extent of resection in transsphenoidal surgery for pituitary adenomas	Per Kristian Hol
14:50-15:00	3D-CT angiography using a 64-slice MDCT of regions from the neck to lower limbs	Tsuguo Honma

FRIDAY, September 8, 2006

CONTRAST MEDIA

Moderators: Hiroyuki Tajima and Peter Aspelin

08:30-09:00	How to avoid CIN when using iodinated CM – best practice in CT	Peter Aspelin
09:00-09:15	Contrast media induced nephropathy - Estimated glomerular filtration rate (eGFR) to find a safe contrast medium (CM) dose to minimize the risk of contrast medium induced nephropathy (CIN)	Ulf Nyman
09:15-09:30	Are gadolinium contrast media really less nephrotoxic than iodine agents in radiographic examinations?	Barbara Elmståhl
09:30-09:45	Hypersensitivity to iodinated Contrast Media	Hugo Flaten
09:45-10:15	Coffee break	

MOLECULAR IMAGING

Moderators: Takaaki Hosoya and Finn Mathiesen

10:15-10:30	Positron Emission Tomography Imaging for Cancer Screening	Tsuyoshi Yoshida
10:30-10:45	Comparison of body diffusion-weighted MR imaging and 18FDG-PET in malignant tumors	Reiji Ochiai
10:45-11:00	Somatostatinreceptorscintigraphy in tumour diagnosis - Somatostatinreceptorscintigraphy with 99m-Tc-Depreotide. Experience from Karolinska University Hospital	Rimma Danielsson
11:00-11:15	3D-MRI and MRS to monitor pharmacological effect on brain overgrowth - Carbamazepine protects the mceph/mceph mouse against megencephaly, abnormal levels of N-Acetylaspartate in vivo and abnormal mRNA levels for Bdnf and Nogo signaling pathway components	Catharina Lavebratt
11:15-11:30	Alzheimer's disease - Brain metabolites during ageing and after treatment of donepezil in APP/PS1 mice	Eric Westman
11:30-11:45	Can Dynamic Susceptibility Contrast Magnetic Resonance Imaging replace Single Photon Emission Tomography in the diagnosis of patients with Alzheimer's disease? A pilot study	Lena Cavallin
11:45-11:55	CT perfusion with permeability surface map in the assessment of glioma	Ryo Takagi
11:55-12:05	Functional MRI of rat brain and spinal cord	Toshiki Endo
12:05-12:15	Brain fMRI in spinally injured rats detects allodynia	Toshiki Endo
12:30-13:15	Lunch	

CAD AND MISCELLANEOUS

Moderators: Hiroshi Fujita and Bo Persson

13:15-13:30	Recent status of developments in an innovative CAD project	Hiroshi Fujita
13:30-13:45	Development of Computer-Aided Diagnostic System for Detection of Lung Nodule in 3D CT	Takayuki Ishida
13:45-14:00	Can CAD be used as a teaching tool?	Edward Azavedo
14:00-14:15	The Impact of Integration of Computer-Aided Detection and Human Observers	Nachiko Uchiyama
14:15-14:30	Some correlation between lifestyle and health data - Seniors lived in their homes and in nursing homes	Tetsuo Okabe
14:30-15:00	The ageing population and health services: The need for moving imaging equipments, not patients!	Frode Laerum

DEVELOPMENT OF MOBILE EMR SYSTEM WITH PACS ON THE FUSED INFRASTRUCTURE WITH INTERNET AND SATELLITE COMMUNICATION

Hiroshi Kondoh

- Hiroshi Kondoh MD, Wakoto Akinaga, Takeshi Washiashi, Shiro Koge
- Tottori University Hospital, NEC TOSHIBA Space Systems Ltd., Enterprise IT Solutions Healthcares Division Agfa-Gevaert Japan, Ltd., Egg Co. Ltd.

Background: The broadband internet services became widely spread in Japan. But many isolated places among the mountains and isolated islands still have no broadband internet services in fact. These areas also suffered from depopulation and disadvantages for medical services. In these areas telemedicine and homecare on the satellite communication network was seemed to be efficient. As hospitals and many medical facilities have internet access with optical fibbers on the ground, it seemed the fused network with internet and satellite communications is necessary.

On the other hand, home care would prevent the advancement of disease and decrease the admission of patients with advanced diseases.

So we planned home care assistant mobile EMR system via the internet and the satellite communication. The first study was made in 2002. We started the second study from 2005. In this paper we reported the initial results of this second study.

Material & Methods: As a solution of digital divide in the isolated places among the mountains and isolated islands in Japan, we started the study of the fusion of internet and satellite communication. And we were developing the new home care assistant system with modification of web-based PACS system and web-camera system, because the web-based system supported the cryptic protocol and could spread the services widely and easily.

We used Web-1000 (AGFA Ltd.) as a web-based PACS, e-filming (Infocom Co. Ltd.) to make DICOM header information of non-DICOM image, and web-based TV conference system (Egg Co. Ltd.).

Images and the other data were sent with this system through the fused network of internet and satellite communication. The performance of systems on the network were investigated.

Results: The images and demographic data could be sent precisely. If the web server and the client were set on the satellite stations, the communication used satellite twice and the delay of satellite communication became too large to make the initial communication between the server and client. The gateway for satellite communication also prevented the connection of TV conference systems. As the gateway also fused the satellite communication and the internet, TV conference systems could be used only in the satellite communications.

Conclusions: The web-based PACS system could make the image-based conferencing system on telemedicine easily and it could handle digital camera images in home care.

The gateway for satellite communication was used for prevention of increase of the delay of satellite communication and for the connection to the internet. We should take measures on the gateway. The cryptic protocol was used on the image delivery, but it would not use on gathering images to the server. VPN was planned to use for this function.

POTENTIAL USEFULNESS OF AN AUTOMATED PATIENT RECOGNITION METHOD OF CHEST RADIOGRAPHS FOR PREVENTING FILING ERRORS IN PACS ENVIRONMENT

Junji Morishita

Department of Health Sciences, Kyushu University

Background: All of the images in the PACS environment should be stored in correct locations, such as in the proper patient's folder in the PACS server. However, if patient's information associated with an image is entered incorrectly, or accidental image acquisitions for a wrong patient occur, the images will be assigned to a different patient and will not be stored in the proper patients' folder. If misfiled cases occurred in the PACS environment, retrieval failure for a specific patient's image from the PACS server is likely. Moreover, if radiologists do not become aware of misfiled cases in their interpretation for a specific patient's image, they may interpret incorrect images for a wrong patient. Thus, misfiled cases in the PACS environment may create serious medical accidents in the hospitals. To prevent the filing error in the PACS environment, we have been developed an automated patient recognition method for chest radiographs based on a template-matching technique.

Material & Methods: Our computerized method is based on a template-matching technique by using images without and with edge enhancement. The correlation value between the current chest radiograph and the previous chest radiograph for the presumed corresponding patient is determined. The correlation value indicates the resemblance between the current and the previous image. If the two images are identical, the correlation value is 1.0. We obtained histograms of correlation values for the same 1000 patients and also for 1000 combinations of current and previous images obtained with two different patients. To identify whether the current image belonged to a "wrong" patient, we set a threshold for the correlation value. If the correlation value between the current image and the previous image was equal to or larger than the threshold, then the current image was considered as belonging to the same, correct patient. On the other hand, if the correlation value was smaller than the threshold, then the current image was identified as belonging potentially to a "wrong" patient. The usefulness of the method was tested prospectively in a hospital. Also the frequency of the filing errors was surveyed at another hospital.

Results: We found that the correlation values between the current and previous images for the same, "correct" patients were generally greater than those for "wrong" patients. Although the two histograms overlap at correlation values greater than 0.80, most parts of the histograms are separated. These results are promising for identifying potentially "wrong" patients based on the template-matching method. The frequency of misfiled cases for chest radiographs in a prospective study was 1.3% (22 / 1703). The correct warning rate and the false warning rate for filing errors by the method based on the template-matching technique was 85% and 1.6%, respectively. We surveyed and analyzed the actual misfiled cases in the PACS environment at another hospital. The average rate of misfiled cases for radiography during 25 months was 0.075% (327/279222). Main causes for the filing error were related to human errors such as incorrect entry of the patient information. These results indicate one of the important issues to be solved for practical use of the PACS for maintaining its reliability.

Conclusion: The computerized method of the automated patient recognition and identification would be a useful tool in reducing wrong images being stored in the PACS server.

THE FUNCTION AND EFFECT IN A PAPER-LESS, FILM-LESS, TOTALLY DIGITALIZED HOSPITAL

Yasutomi Kinosada

- Yasutomi Kinosada, Akinobu Yoshimura
- Department of Biomedical Informatics, Gifu University Graduate School of Medicine

Background: We introduced a new electronic patient record (EPR) system termed clinical information system (CIS) based on an optical fiber network system in Gifu University Hospital on June 1, 2004. In this study, we developed the CIS that enabled cooperative diagnosis and medical care by interchanging patient records of each medical department bilaterally in real time. It is based on the concepts of "total intelligent hospital" and "filmless and paperless hospital" in order to use it not only for daily diagnosis but also to enhance the quality of medicine. In this paper, it is demonstrated that the system achieves functional stability and improves the efficiency of medical care.

Material & Methods: In order to establish a new EPR system in Gifu University Hospital, we considered various types of information required by the medical staff and hospital management. The CIS terminals are installed in each department and can perform the same operations. Therefore, every departmental system can send examination results, such as radiographic and endoscopic images, to the central CIS server, which responds to every request from the CIS terminals. Irrespective of their sizes, all types of image information were stored in the CIS server in the uncompressed form. Further, we considered the development of an efficient environment in which all types of patient information are available to the medical staff in the hospital. The CIS server is a hospital-wide central storage system with a storage capacity of 100 terabytes.

Results: A new style of clinical consultation was produced by using the CIS based on the high-speed network system. In multidimensional CT, the number of images exceeds 2,000 in 30 s. This implies that the 1 gigabyte of image data obtained in 30 s should be processed efficiently. This was achieved by the optical-fiber-based enterprise network system. Moreover, we created provisions for it to store a large quantity of various image data. We can receive 1 gigabyte of image data within 10 seconds by using the CIS terminals with a network speed of 1 Gbps. In addition, we proved that the network speed can improve the quality of medicine. This implies that the unified management of patient records is achieved between various departments, and it becomes extremely convenient to share patient records in real time among the medical staff in the hospital. Therefore, the quality of medicine and patient services is improved considerably.

Conclusion: We presented the concepts of a totally intelligent hospital and filmless and paperless hospital. We incorporated these concepts into the new CIS for a hospital and observed that it functioned stably. An enterprise optical-fiber-based high-speed network system is very effective and probably essential for accelerating the data transfer process. We believe that this system will help mitigate the intense workload in hospitals.

LEGAL ISSUES WHEN IMPLEMENTING A TELERADIOLOGY SOLUTION BASED ON THE IHE-XDS-I PROFILE

Aslak Aslaksen

- Haukeland University Hospital and Bergen University, Bergen, Norway

Since 2003 the Regional health authority of Western Norway has been planning a teleradiological solution. The Regional health authority of Western Norway comprises of 4 local health authorities with a high degree of autonomy. As a result of this autonomy, each of the health local authorities has chosen PACS and RIS systems from different vendors. The Western Norwegian teleradiology project was initiated by the regional authority in order to improve health care by improving the process by which radiological examinations could be retrieved across the whole region. At the time initiation of the project no standard profile for a cross-enterprise solution was available. However, in 2004 IHE (Integrating the Healthcare Enterprise) launched its new XDS (Cross Enterprise Document Sharing)-profile. In 2005 the teleradiology project management decided to adhere to the new XDS profile from IHE as a model for implementing its project.

The XDS profile permits an open communication of PACS and RIS information between enterprises for the advantage of patient care. However, Norwegian legislation concerning patient privacy is restrictive towards common databases across enterprises and to which extent health care workers should be given permission to retrieve and read examinations performed in institutions other than where they are employed.

The paper will discuss strategies to overcome legal obstacles when implementing a teleradiological solution based on the XDS profile.

RECENT STATUS OF DEVELOPMENTS IN AN INNOVATIVE CAD PROJECT

Hiroshi Fujita

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Background: The recent status of our research project on developing computer-aided diagnosis (CAD) systems are presented, which is from a big project called "Knowledge Cluster Initiative for Gifu-Ogaki Area: Robotic Advanced Medical Cluster (2004.4-2009.3)." This project consists of three main sub-projects: 1) development of surgical support systems for minimally invasive, minute surgery, 2) development of medical diagnosis support system including CAD, and 3) development of medical training education system with virtual reality (VR) technology. The sub-project 2) includes the developments of three CAD systems for retinal fundus images in eyes (fundus CAD), MR and MRA images in brain (MR brain CAD), and ultrasound 3D images in breast (US breast CAD), all of which are employed in the screening situations in Japan.

Material and Methods: In fundus CAD, the detection of arteriolar narrowings, hemorrhages and leukomas, and for analysis of crossing point of blood vessels are included. The mathematical morphology operator was employed for extraction of the blood vessels. The vessel diameters of artery's and vein's branches at the nearest point were calculated, and the artery with under a half of vein's diameter was detected as an arteriolar narrowing. For detection of hemorrhages and leukomas, we used a multiple-phase binarization and then the false positives (FPs) were eliminated using 5 features.

In MR brain CAD, for determining initial candidates of lacunar infarcts on T1- and T2-weighted MR images, we used a top-hat transform and a multiple-phase binarization. We then employed an artificial neural network (ANN) with 12 features for reduction of FPs. For detection of aneurysms on MRA images, a gradient concentrate filter was employed in determining initial candidates and an ANN with 4 features for reduction of FPs was applied.

In whole breast ultrasound (US) CAD for mass screening, vertical edges around the border of a mass by a Canny edge detector were extracted for determining initial candidates of masses.

Results: The sensitivities for the detection of arteriolar narrowings, hemorrhages, and leukomas were 88 % (specificity of 63 %), 79 % (specificity of 71 %), and 74 % (specificity of 87 %), respectively, and that for the analysis of vessel crossing points was 82 % (specificity of 76 %). The sensitivity for the detection of lacunar infarcts was 97 % with 0.7 FP per image and that for intracranial aneurysms was 100 % with 1.4 FPs per patient. The performance of the CAD scheme in detecting malignant masses reached the sensitivity of 91 % with 0.7 FP per image. Although mass screening using US images is considered to be unsuitable due to poor reproduction of images acquired with conventional hand probe, this problem can be solved in our whole breast US system with CAD.

Conclusion: The status of our ongoing CAD project in developing three CADs aiming commercially available systems in different imaging fields is very promising in general.

DEVELOPMENT OF COMPUTER-AIDED DIAGNOSTIC SYSTEM FOR DETECTION OF LUNG NODULE IN 3D CT

Takayuki Ishida

- Takayuki Ishida, Megumi Yamamoto, Ikuo Kawashita, Masayuki Kagemoto, Koichi Fujikawa, Mitoshi Akiyama

- Hiroshima International University

Background: Interpretation of CT image is a time-consuming task for radiologists because a number of CT images are obtained by multi-detector row CT. Therefore, we have developed automated computerized method for the detection of lung nodule in 3D CT.

Material & Methods: Our image database includes 69 clinical cases which have 73 nodules with pathological diagnosis. Nodules with a large variation in size (4.5-15.5mm) are included. Forty eight out of 73 nodules are less than 9.0mm in diameter. Slice thickness ranged from 5 to 10mm and their reconstruction intervals are 5-14 mm. In this scheme, the background components in the lung area, such as heart, chest walls, and non-uniform background trend, are eliminated from original CT images based on a morphological filtering technique. The semicircular nodule adjacent to the thoracic walls could be easily detected. Then, lung segmentation technique based on a gray-level thresholding technique with a feature analysis is performed.

To enhance lung nodules, we employed 3D cross-correlation method by use of 3D zero-surrounded Gaussian template. False positives are reduced by using feature analysis with 54 features such as average, standard deviation of CT value, size, shape, contrast, moments of the detected nodule candidates. For further reduction of false positives, we used Sobel orientation image because the edge orientation of nodule tend to converge to the center of the nodule. In addition, line components mainly due to vessels are eliminated by using nonlinear line enhancement filtering technique on 30mm thickness maximum intensity projection (MIP) image.

Results: Nodules adjacent to the thoracic walls could be easily detected by use of background reduction image that is obtained by subtraction of background components, which are made by the open and the close filtering. 3D cross-correlation technique by use of 3D zero-surrounded Gaussian template as a model of lung nodule is selectively enhanced lung nodule. As a result, number of false positives was 5.2/case at a sensitivity of 95.8%.

Conclusion: We have developed automated computerized scheme for the detection of lung nodule. This method could assist radiologists for the detection of lung cancer. It might be possible that physician could save interpretation time by showing the location of detected nodule.

CAN CAD BE USED AS TEACHING TOOL?

Edward Azavedo

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CAD is a technological modality that has improved substantially during the last decade. The first report of a possible use of CAD in assessing breast radiology examinations was published in 1967 (Radiology, 89:211-215) but little was known or done during the next 2 decades. Many research groups have developed their own CAD systems of which only a few turned up as commercially available usable products.

Most of the CAD algorithms were initially concentrated on calcifications and subsequently efforts were made to detect other abnormalities such as densities, spiculations, distortions, asymmetries etc.

Detection of calcifications was quite an easy task for the computer programmers so the sensitivity of CAD for calcifications was pretty high right from the start. The problem arose to have a high specificity since calcifications representing benign features such as blood vessels, calcium deposits, sclerosing adenosis etc were also prompted by the systems. Luckily dedicated work to resolve this aspect was successful and today we have almost 100% sensitivity with an acceptable very high specificity.

Prompting lesions without calcifications remain a challenge today. The sensitivity for these lesions is around 90% but the specificity is unacceptably low. This is unfortunately true to all commercially available systems. This in turn is the major obstacle in using CAD as a teaching tool since elimination of unwanted positive markings on lesions other than calcifications can only be done by experienced radiologists. A radiologist under training can not and should not disregard a false positive mark without proper assessment which in turn is directly proportional to the radiologists own experience. When there is access to an experienced radiologist then the CAD could be used by the radiologist under training so that he or she could then get the necessary explanation why certain findings need assessment and others do not.

In conclusion, CAD has made tremendous improvements especially during the last decade and it can certainly be used in clinical practice if and when above mentioned points are considered.

THE IMPACT OF INTEGRATION OF COMPUTER-AIDED DETECTION AND HUMAN OBSERVERS

Nachiko Uchiyama

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- This study was supported by cancer research grant of Japanese ministry of health, labor and welfare, FUJIFILM, Japan and FUJIFILM Medical Japan.

Background: We evaluated the impact of integration of CAD and human observers regarding diagnostic accuracy in digital mammography.

Materials and Methods: We utilized CR system with 50 microns and non-commercial CAD. The images were diagnosed utilizing soft-copy reading system with 5M pixels. The total number of cases was 50 including 23 malignant cases and 27 benign cases. We randomly selected two groups of observers: non-informed observers and informed observers with regard to CAD system's ability. The ability of CAD was as follows: the average FP marker rate was 1.6 markers per normal 4-view case, sensitivity in calcification was 100.0% and sensitivity in mass was 71.1%. Observers recorded the diagnosis and the schema before and after utilizing CAD in accordance with BI-RADs category and six diagnostic categories in accordance with diagnostic confidence regarding malignancy. Diagnostic accuracy was evaluated regarding sensitivity, specificity, NPV, PPV, and ROC analysis utilizing ROCKIT software (Version 0.9.1 BETA).

Results: With the non-informed group, averaged data of sensitivity, specificity, PPV, and NPV did not show any changes with or without CAD. On the other hand, with the informed group, averaged data of sensitivity and NPV were improved compared to those in pre-CAD because one observer could detect malignant microcalcifications utilizing CAD. However, there was no significant difference between the data in pre-CAD and in post-CAD by paired-t test ($P > 0.05$). A (z) value showed that with the non-informed group, there was no significant statistical difference between pre-CAD and post-CAD ($P = 0.382 > 0.05$). On the other hand, with the informed group, four of five observers showed better performances in post-CAD. One observer showed no difference. Averaged data showed higher performances utilizing CAD, however, there was no significant difference between pre-CAD and post-CAD ($P = 0.115 > 0.05$).

Conclusion: Human observers should be notified about the ability of CAD system in cancer detection before they utilize it in order to improve integration between CAD system and human observers.

SOME CORRELATION BETWEEN LIFESTYLE AND HEALTH DATA - SENIORS LIVED IN THEIR HOMES AND IN NURSING HOMES

Tetsuo Okabe

- Tetsuo Okabe, MS and Shohei Kanno, MD
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In Takasaki area, number of elderly persons is gradually increasing who choose a nursing home rather than their own homes, to live in for the rest of their life. We have studied to see if there is any correlation available between their lifestyle and their health data with the support of Takasaki city hall for these two years. Six students have studied together this problem for their Bachelor of Arts' thesis.

The city hall recommended us to investigate three groups of elderly volunteers. Group A and B are those who live in their own homes, and Group C is those who live in a nursing home. Group A consists of twelve persons who used to be farmers growing rice and wheat, and their averaged age is sixty-five years old. Whereas Group B is composed of twenty-six persons who are retired office workers, and their averaged age

is seventy years old. Group C consists of seventeen persons who are also retired office workers, and their averaged age is seventy-five years old. All these fifty-five elderly persons are healthy and active enough to do everything by themselves.

(1) We investigated their lifestyle, foods, hobbies, and others by asking them to fill in our questionnaire card.

(2) We examined six items of their physiological data: BMI, Body fat ratio, Bone mineral, Blood pressure, Oxygen saturation in blood and Pulsation form of blood.

(3) We measured eight items of their biochemical data; total cholesterol, AST(GOT), ALT(GPT), γ -GTP, glucose, creatinine, urine acid, and triglyceride.

Elderly persons, who live in their homes, have a lot of hobbies and a positive taste for foods to enjoy their senior life, but their health data are not so good, whereas persons who live in a nursing home are less active but their health data are better.

Takasaki city hall said that they will make their administrative plan for the elderly persons in order to let them enjoy healthy life, considering the results our study. They will show some way of food control, hobbies, recreation and so forth.

THE AGEING POPULATION AND HEALTH SERVICES: THE NEED FOR MOVING IMAGING EQUIPMENTS, NOT PATIENTS!

Frode Laerum

- Intervensjonssenteret, Rikshospitalet, Oslo, Norway

Moving equipment, not patients: Use of mobile, digital radiography for nursing homes' residents – Experiences with light- weight DR equipment with hard disk or wireless transmission of images for reading and reporting.

Purpose: 1) To improve radiology services to nursing home residents. There are three times as many beds in nursing homes (NH) as in all Norwegian hospitals combined. Each resident has in average more than three chronic diseases, 65% have dementia, and are hence more stressed by being moved than other patients.

2) To assess logistics, quality and safety in using a mobile, digital radiography (DR) system for diagnostic x-ray services in NH, and survey the outcome of this kind of radiological services.

Methods and Materials: A prototype combination of Sedecal X-ray equipment with Canon full-format digital detector (total weight 94kg) was carried around to nursing homes on demand, in a Renault Kangoo car equipped with wheel-chair ramp. The DR examinations were performed in the residents' rooms. Encrypted image and referral sheet data where either WI-FI uploaded via broadband Internet, or brought by USB-disk,

to the radiology department's PACS for interpretation and reporting. The referring physician returned questionnaires without patients' identification in 125 out of the first 195 examinations. On the first 193 images an image quality assessment where made.

Results: Since the start in Sept. 2004 780 patients from 46 nursing homes have had more than 1000 examinations. The DR image quality was assessed to be of satisfactory diagnostic quality, not significantly different from controls taken with a fixed x-ray unit. The questionnaires revealed that tentative diagnosis was verified in 58% and invalidated in 42 % of the cases, with consequences to therapy in 85% and nursing in 71%. Because of the residents' serious impairments, 10% had no alternative to x-ray examination bedside in their nursing home. 8% had to be hospitalised after the examination. Expensive patient transportation with ambulance or taxi to an outpatient radiology examinations, or hospitalisation, where avoided in 90% of cases.

Conclusion: Since the start late 2004 the service has increased in use, and after almost 800 examined patients to date, data suggest that DR services have proved to be a viable service, in benefit for the residents, less expensive for society, and of good diagnostic quality.